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Agricultural Workers, Credit Rationing and Family Networks in Rural Mexico

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ABSTRACT *We use mixed methods and first-hand household data in Mexico to investigate credit practices by households engaged in agricultural wage employment. Quantitative analysis shows evidence of rationing in the formal sector but also suggests the existence of mitigating mechanisms. Qualitative analysis provides additional insights. First, income patterns associated with agricultural wage generate income smoothing needs that are sometimes better met by the informal sector. Second, family networks can perform key functions as gateways to the formal sector, through specific informal arrangements that inject flexibility into formal rules and procedures.*

I. Introduction

Agricultural wageworkers are hardly visible in development studies. This is paradoxical if we consider their prevalence as well as their low socioeconomic status (De Janvry, Sadoulet, & Wilcox, 1989; FAO, 2012; Gindling & Newhouse, 2014; The World Bank, 2007). The research and policy agenda regarding agricultural workers has mostly focused on their working conditions, concentrating efforts on labour safety, social security, and the fight against child labour (FAO, 2012). Less attention has been given to other exclusion processes, such as credit rationing. This is at odds with recent work on financial inclusion, which argues that appropriate financial services can help the poor, including casual wage labourers, smooth consumption and cope with vulnerability (Collins, Morduch, Rutherford, & Ruthven, 2009; Guérin, Morvant-Roux, & Servet, 2011).

The paper addresses the issue of credit rationing, focusing on the case of agricultural wageworkers in a productive agricultural region of Mexico. It makes a threefold contribution to the existing literature. First, it focuses on the often-overlooked category of agricultural workers, analysed at the household level. Second, it addresses the issue of credit rationing using a conceptual framework that allows exploration of the linkages between agricultural labour and credit markets, and the social embeddedness that underlies both informal and formal contractual arrangements. Third, we use first-hand data and a mix of quantitative and qualitative methods to provide evidence and discuss the underlying causality mechanisms.

The outline of the paper is as follows. Section II reviews the relevant literature. Section III presents the methodology. In section IV, we develop the contextual features of the local agricultural labour and

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financial markets. Section V is devoted to the quantitative analysis of formal and informal financial practices of agricultural wage households. It shows evidence of rationing in the formal sector, but also suggests the existence of mitigating mechanisms. In Section VI, we rely on qualitative data and analysis to offer a broader interpretative framework. First, we show that income patterns associated with agricultural wage generate income smoothing needs that are sometimes better met by the informal sector. The conceptual category of 'credit rationing' can thus be misleading in this context, and thinking in terms of segmented demand for financial products might prove more fruitful. Second, we show how family networks can perform as gateways to the formal sector, through specific informal arrangements that inject flexibility into formal rules and procedures.

II. Literature Review

The paper is related to the strand of neo-institutional household economics literature that examines the implications of multiple sources of market failures, including labour and credit, which are pervasive in rural settings of developing countries (Bardhan, 1980, 1989; Binswanger & Rosenzweig, 1986; De Janvry, Fafchamps, & Sadoulet, 1991; Eswaran & Kotwal, 1985, 1986).[1] Within this framework, we include the interlinkages between labour and credit markets (Datta, Nugent, Tishler, & Wang, 1988), and the embeddedness of markets and contracts in social relationships and networks (Cox & Fafchamps, 2007; Fafchamps, 1999, 2006; Granovetter, 1985).

Our research is related to the theoretical and empirical literature on the determinants and consequences of credit rationing, following the seminal work of Stiglitz and Weiss (1981) and Braverman and Guasch (1986) for the rural sector. With its focus on informational asymmetries and transaction costs, this literature shares the same conceptual foundations as above. The emphasis was originally on the supply-side sources of rationing, distinguishing between (1) *quantity rationing* (linked to the practical impossibility to clear the market through the interest rate in a context of adverse selection and moral hazard, and the resulting need for collateral requirements) and (2) *transaction cost rationing* (because the high fixed component of transaction costs relating to credit procedures tends to ration out smaller loans). More recently, the focus has broadened to include rationing originating from the demand side, which has been coined *risk rationing*, in reference to the fear of losing essential income-generating assets in the case of repayment default, in risky environments (Boucher, Carter, & Guirkinger, 2008).

Credit rationing also relates to the broader issue of sectoral interactions among formal and informal credit under credit market failure. The issue is often framed in terms of whether the informal sector performs as a substitute or as a complement to the formal sector. In the substitute version, the informal sector is presented as attending the spillover demand that cannot be met by the formal sector, because it can overcome some of the informational and transaction cost barriers, albeit at a high cost (interest rate) for the borrowers. In the complement version, the informal sector is considered to attend a different kind of demand in a segmented market. Studies by Kochar (1997) and Boucher and Guirkinger (2007) favour the substitute/spillover view. In subsequent work, however, Guirkinger (2008) presents evidence of market segmentation in rural Peru. Zeller (1994), Johnson (2005) and Guérin, Roesch, Venkatasubramanian, and D'Espallier (2012) also point in that direction.

The neo-institutional perspective often overlooks the non-economic dimension of credit (an exception is Fafchamps (1999) who discusses the hybrid nature of financial arrangements, which combine market and non-market features, including gift and reciprocity). Other, more anthropology-oriented references, rightly emphasise its social dimension, particularly regarding rationing: social discrimination and internalised self-restriction also come into play (Guérin, D'Espallier, & Venkatasubramanian, 2013; Johnson & Nino-Zarazua, 2011; Morvant-Roux, Guérin, Roesch, & Moisseron, 2014). On the other hand, social mechanisms can offset the exclusion mechanisms, not only in the informal (see Shoji, Aoyagi, Kasahara, Sawada, and Ueyama (2012) for a review) but also in the formal sector. A typical example is that of group loans with joint-liability (Karlan, 2007; Zeller, 1994). There are no such loans in our study, but family networks, in contrast, turned out as determinant. While family networks are often considered an informal, alternative source of credit (Fafchamps, 1999), here we

also examine how they can facilitate access to formal finance, elaborating on the approach eschewed by Ayalew Ali and Deininger (2012).[2]

III. Methodology: A Combination of Quantitative and Qualitative Data Collection and Analysis

The paper builds on a combined quantitative and qualitative approach, which intends to take advantage of the complementarity between two types of empirical material and analysis: quantitative data measuring (mostly) outcomes, and narrative information providing insights on the underlying processes (Kanbur & Shaffer, 2007; Lipton, 1992).

The paper draws on first-hand socio-economic data collected in 2010 in the *valle de Autlán-El Grullo*, in the western state of Jalisco: a regionally representative household survey of 400 rural households (out of which 170 turned out to earn some share of their income through agricultural wage), and 40 in-depth interviews conducted with a subsample of households involved in agricultural wage employment.

The survey was implemented in 10 randomly selected villages. In each village, 40 households were selected at random. The questionnaire included conventional sections on household composition, income portfolio, assets, and detailed modules on financial practices and labour contracts. The section on credit rationing was based on Boucher, Guirkinger, and Trivelli (2009). General contextual information was also gathered through interviews with local authorities in each village.

In a second stage, we undertook a complementary set of in-depth interviews with a non-random, criteria-driven subsample of 40 households involved in agricultural wage employment, with the aim to document the heterogeneity within the category of agricultural wageworkers. The interviews focused on specific aspects, including: the diversity of agricultural labour contracts; how agricultural wage labour fits into the household's portfolio of income sources[3]; and the conditions (and/or barriers) of access to and use of formal and informal financial services.

We also rely on a mixed methods approach to present evidence and discuss the results. While the quantitative analysis provides trends on outcomes, the interpretations and discussion are based on qualitative grounds. As a result, the causal mechanisms referred to in the paper are not only based on econometric robustness checks, but are considered as a nexus of processes leading to the observed outcomes.

IV. The Local Credit and Agricultural Labour Markets

The *valle de Autlán-El Grullo* is a relatively well-endowed and dynamic agricultural region. Infrastructure such as roads and public services are fairly developed. The agrarian structure is heterogeneous, combining small subsistence producers, small and medium market-oriented producers,[4] and agro-business firms. Overall, agriculture is dynamic, thanks to irrigation and insertion into national and export value chains such as sugarcane, horticulture, and agave for tequila production. The region also benefits from high volumes of remittances from migrants in the United States.

The Agricultural Labour Market

The main crops grown in the region structurally rely on wage labour during all or part of the production cycle. The local agricultural labour market involves both a local workforce (permanently residing in the area) and a migrant workforce (coming from poorer states of the country for temporary stays).[5] In this section, we rely on survey data and in-depth interviews to provide an overview of the labour market, from the local workforce's perspective. The migrant workforce was not considered in this specific study, except for a handful of households that eventually settled down in the area and could be included in the sample.[6]

Two major features can be drawn from our data. First, agricultural wage employment represents the major source of income in terms of household participation. 42.5 per cent of the sample households are

Table 1. Agricultural labour contract characteristics

Panel A – Contract characteristics (N = 263)	
% formal contracts (pay check or social security)	20.5
Contract status	
% permanent	33.5
% seasonal	59.3
% casual	7.2
Average duration of seasonal contracts (months per year)	7.2
Relationship with employer	
% employer either a family member or a friend	26.2
% labour relationship lasting for more than 5 years	
Permanent	48.3
Seasonal	55.2
Casual	61.1
Panel B – Interlinked agricultural labour-finance arrangements	
% out of agricultural wage households (N = 170)	
Wage deposited on a formal savings account	1.8
Wage advances	7.3
Credit by employer	0.6

Source: RUME project.

engaged in agricultural wage labour (with an average 1.5 contracts per household), and for 53 per cent of them, agricultural employment is the only source of income. Although a dynamic perspective is out of the scope of the paper, life stories suggest that agricultural labour is mostly a structural feature of these households' livelihoods. We observed individual fluctuations (household members moving in and out of the labour market depending on idiosyncratic opportunities or shocks), as well as scant cases of individuals moving up the agricultural labour ladder,[7] but we could see no evidence of the so-called agricultural ladder, whereby agricultural employment would be the first (and temporary) stage of a steady accumulation process leading to the category of landowner farmer.

Second, labour contracts greatly differ according to employer and type of job, across and within value chains. Although a detailed characterisation of this diversity is out of the scope of the paper, Table 1 and the following discussion provide an overview of some features which are of interest in relation to their potential linkages with the financial practices of agricultural workers.

Nominal agricultural weekly wages amount to an average of US$60. This is 30 per cent lower than the average non-agricultural wage, even before considering the low probability attached to obtaining a full-time agricultural job each week of the year. Only a third of contracts are permanent. Seven per cent are casual, implying a high level of precariousness. Around 60 per cent are seasonal, lasting on average seven months a year, which suggests that over the remaining five months, income-smoothing can be an important issue if complementary sources of income are lacking or insufficient.

Qualitative evidence provides insights on the challenges that job hunting can represent for households engaged in casual or temporary agricultural work.

> *We go and ask for a job directly at people's place, farmers that we know and who know us […] we go from one to another depending on who is willing to help us […] there is less work from march till may […] in this period we sometimes spend one or two weeks without working and earning anything.*

Even though labour contracts do not mostly involve employer belonging to close family and friends' networks (26% of total), personalised relationships of some kind do prevail in the local labour market. The share of contracts involving a lasting relationship with the employer (five years or more) is interpreted as an indirect indicator of this. It stands slightly below 50 per cent in the case of permanent contracts, and rises to 55 per cent and 61 per cent in the case of seasonal and casual contracts

respectively. On the qualitative side, the importance of personalised relationships is illustrated by the *verbatim* above and abundant additional qualitative evidence, particularly in the case of seasonal and casual work. Maintaining good relations with the employer is instrumental in reducing uncertainty and improving access to work. It can also facilitate interlinkages with credit.

The main tied labour-credit arrangements are cash advances on weekly wages, and cash credit that will be paid later in work (in a job-rationed context, this arrangement also allows the worker to secure future access to work). No interest is charged in either case. Such interlinkages are reported in more than one third of the in-depth interviews, appearing as a very common feature. This contrasts with the low figures drawn from the quantitative data (Table 1, Panel B), and suggests that there was severe under-reporting of such practices in the survey. Although interesting from a methodological perspective, this gap between data sources unfortunately prevents us from going further in the quantitative analysis of this kind of market linkage.

Finally, a minority of contracts (20.5%) are formal in the sense that there is a formal paycheck and/or access to social security, and less than two per cent of agricultural wage households have their wage deposited by the employer on a formal savings account. Thus, the formal agricultural labour market does not appear to perform as a gateway to formal finance.[8]

In summary, even if the local agricultural labour market encompasses a wide variety of situations, informality, low wages, seasonality, chronic sub-employment, and the resulting uncertainty of income streams are important features that we can expect to impact the agricultural workers' financial practices.

The Local Credit Market

Table 2 provides a summary of the loan characteristics reported by the surveyed households, disaggregated by providers. Note that all the loans are individual. On the formal side, the financial cooperatives stand out, both in terms of loan numbers and loan size. The sizeable outreach levels – all the more so for the rural sector – of these regionally-established financial cooperatives, some of which have been operating since the 1950s, contrast with the gloomy picture at the national level (Demirgüc-Kunt, Beck, & Honohan, 2008). The private sector banks all have branches in the two small towns in the region, but they mainly target urban households. On the informal side, the shopkeeper stands out in terms of loan numbers, with small loan sizes and a high turnover (on a weekly basis), which signals a distinct, consumption-smoothing oriented, credit market segment. Loans from the social network (family and friends) are also relevant, and their characteristics indicate that, when available, they

Table 2. Loan characteristics, by provider

	Financial cooperatives	Banks	Family and friends	Shopkeeper	Moneylender
Number of loans[a]	163	13	59	200	10
Average loan characteristics					
Amount	1723	981	362	33	168
Monthly equivalent interest rate	1.8	1.6	n.a.	n.a.	9.9
Maturity (months)	18	21	3	0.25	5
% Monthly repayment	82	77	10	0	80
Time to get to the provider (minutes)	23.1	27.7	12.3	–	3.9
Time between application and disbursement (days)	2.6	4.8	1.5	–	1.1
% Guarantor	74	8	0	0	0
% Land collateral	0	0	0	0	0

Source: RUME project. *Notes*: Means for dummy variables are reported as percentages. Amounts in US$.
[a]For all sources but shopkeeper: number of loans outstanding at some point during the 12 months prior to the survey. For the shopkeeper: number of outstanding 'accounts' over the 12 months.

have the potential to partly substitute for formal loans. Loans by moneylenders are not common (a fact confirmed by the qualitative data), possibly because of the local availability of better options.

Given that formal credit is mostly provided by cooperatives, we focus on them in the remainder of this section, which discusses the economic and social barriers to formal credit.

Economic barriers to becoming a member mostly refer to the capacity to pay for upfront membership fees, which range from US$43 to US$100 (which include a life insurance), depending on the cooperative. Although not very high, these amounts can be binding for budget-constrained households. Transaction costs are moderate. Filing the membership application is not cumbersome and the branches are physically accessible (less than half an hour away, on average). However, for low socioeconomic level households, there can be social barriers linked to the perceived capacity to step into a cooperative branch to ask for information regarding membership and loan applications.

Transaction costs related to credit application are low (no administrative cost is charged, and the average declared time between application and disbursement is less than three days), and there are no restrictions related to credit use. However, complying with the collateral requirements can entail economic and social barriers to credit take-up. For loans below US$20,000, which make up all the loans in our database, no physical collateral (such as land) is required. What directly affects the capacity to borrow is the savings capacity, since it serves as liquid collateral. A loan called 'automatic credit' can be obtained in a very expedient way through a leveraging system from the member's savings balance of two or three to one. If the savings capacity is binding, another loan product, called 'ordinary credit' can be obtained with a higher leverage (five or ten to one). However, in addition to the compulsory savings, one or two guarantors, depending on the loan size, are required to provide additional back-up to the loan application. The guarantors must be members of the cooperative, and must not be late on any of their own repayments. In case of default, the guarantor loses access to his or her savings account and cannot apply for a loan until repayment is made. Because enforcement is effective, there is a lot at stake in the guarantor-debtor relationship, which is reflected in the following statistics: 97 per cent of the credits backed by a guarantor involve a close family or friend relationship[9]; 45 per cent involve reciprocity, that is, the current loan taker has served as a guarantor for her guarantor before.

> 'We lend[10] our signatures to each othe'" [herself and her three brothers, all of them members of the same cooperative].

> *Miguel, his mother and his nephews are members of the same Caja. This ensures that they will be able to get a guarantor, without the need to look for other people.*

Relying on a close family network to reciprocate guarantorship can entail several advantages: information asymmetries are arguably lower, and because of the socially embedded nature of the arrangement, commitment both to repay and to reciprocate is arguably stronger.[11] Conversely, a low capacity to mobilise social and family networks to comply with the guarantor requirement can represent an additional social barrier to formal credit.

Finally, the repayment schedule (mostly on a monthly basis) can be perceived as a constraint for households with uncertain and fluctuating incomes. With credible threats in case of repayment default, this can induce ex-ante risk-rationing.

V. Financial Exclusion and Credit Rationing of Agricultural Wage Households: A Quantitative Inquiry

Descriptive statistics on a range of socioeconomic variables (Table 3) indicate that agricultural wage households are on average poorer, with a less diversified income portfolio, less assets, less education, and a lower capacity to rely on a family network (we assume that having inherited land and receiving

Table 3. Households' demographic, income, and asset indicators

Means	No agricultural wage	Agricultural wage[d]	Exclusive agricultural wage[e]
Household head			
Age	56.4	49.5***	48.2
Local[a]	97.8	93.5**	93.3
Indigenous	0.4	2.4*	4.4*
Secondary education[b]	27.8	15.3***	17.8
Income portfolio (dummies)			
Agriculture	31.3	10.6***	0
Agricultural wage employment	0	100	100
Non agricultural self employment	32.2	16.5***	0
Non agricultural wage employment	43.5	27.1***	0
Transfers (dummies)			
Remittances	32.2	22.9**	22.2
Government cash transfer	37.4	34.7	34.4
Assets			
Owned land	33.5	8.2***	2.2***
Irrigated area[c] (ha)	2.1	0.4***	0
Inherited land	27.4	5.9***	1.1***
Owned house	80.9	65.9***	57.8**
Boiler	37.8	19.4***	14.1*
Observations	230	170	90

Source: RUME project. *Notes*: Means for dummy variables are reported as percentages. The stars indicate the conventional significativity levels (*: 10%; **: 5%; ***: 1%) of a comparison of means between the households categories. [a]Household head comes from the region. [b]Head's education higher than complete primary school. [c]Restricted to the subsample of landowners (irrigated or rain fed). [d]The reference category are the households with no agricultural wages. [e]The reference category are the households with non exclusive agricultural wages (not shown).

remittances are proxies for a higher capacity, and that being a migrant from another region or being indigenous are proxies for a lower capacity). The trends are more pronounced for the households relying exclusively on agricultural wage income as opposed to the households who combine agricultural wage with other sources of income.

Agricultural wage households can thus be expected to face the two kinds of barriers (economic and social) more strongly than other categories of the rural population, and to exhibit higher levels of exclusion and rationing, both in terms of access to a formal financial institution and in terms of formal credit uptake.

Descriptive Statistics

Table 4 displays descriptive statistics of key indicators related to formal sector access and credit uptake.

The 'formal sector access' dummy takes the value one for households that are either members of (at least) one savings and credit cooperative, or hold a savings account in a formal bank. The former does not imply necessarily that there is a formal credit uptake during the recall period, but it means that there is a readily accessible gateway to apply for one if needed.[12] Households with agricultural wage have significantly lower access to formal financial sources than households without agricultural wage: 44 per cent versus 66 per cent. The lower inclusion trend is more pronounced for exclusive agricultural wage households (35%).

Among the sources of exclusion, we consider risk-rationing, quantity-rationing and low savings capacity. The 'risk-rationed' dummy takes the value one for households that reported not becoming a member of a cooperative or asking for a loan for fear of the consequences in case of repayment default. The 'ex ante quantity-rationed' dummy designates households that reported not becoming a

Table 4. Households' credit practices

	No agricultural wage	Agricultural wage[a]	Exclusive agricultural wage[b]
Formal sector access dummy	66.1	44.3***	34.8***
Sources of exclusion (subsample of non formal sector members)			
Risk-rationed dummy	36.8	52.7**	55.2
Ex ante quantity-rationed dummy	19.7	15.1	13.8
Lack of savings capacity dummy	70.6	76.7	76.9
Formal credit (subsample of formal sector members)			
Formal credit uptake dummy	56.1	67.6	74.2
Credit with guarantor dummy	44.6	36.5	25.8
Total formal debt amount (zero excluded)	1687	889***	698
Risk-rationed dummy	18.9	14.9	16.1
Quantity-rationed dummy	2.7	8.1*	6.5
Household guarantor for others dummy	40.5	24.3**	38.7**
Informal sector (whole sample)			
Informal credit uptake dummy (shopkeeper excluded)	17.0	20.4	14.6**
Total informal debt amount (zero excluded)	415	365	181*
Total social network debt amount (zero excluded)	407	393	152*
Shopkeeper dummy	44.2	59.9***	60.7
Amount shopkeeper (zero excluded)	33	32.5	30
Observations	230	170	90

Source: RUME Project. *Notes*: Means for dummy variables are reported as percentages. The stars indicate the conventional significativity levels (*: 10%; **: 5%; ***:1%) of a comparison of means between the households categories. [a]The reference category are the households with no agricultural wage. [b]The reference category are the households with non exclusive agricultural wage (not shown). Amounts in US$.

member of cooperative or asking for a loan because they anticipated they would not comply with the requirements to obtain a loan. Restricting the sample to the households that are not members of the formal sector, agricultural wage households state a much higher rate of risk-rationing, as expected (52.7% versus 36.8%). Quantity-rationing is less frequently reported than risk-rationing, and does not significantly differ across categories. Finally, access restriction driven by a low savings capacity is widely mentioned (more than 70%), but there is no significant difference across categories.

Indicators of formal credit uptake (computed for the subsample of households that are members of a formal financial institution) are more mixed. Indeed, average formal debt is significantly lower for agricultural wage households (US$890 against US$1690 if we consider only non-zero figures), and the share of quantity-rationing[13] is higher (8.1% against 2.7%). However, the share of households with an on-going formal credit and the rate of risk-rationing show no difference across categories. This suggests that the main barrier to financial inclusion and the related exclusion processes takes place at the moment of becoming a member of a formal financial institution. The econometric analysis below further supports this view.

The share of formal sector households with a credit backed by a guarantor is not significantly different between non-agricultural wage and agricultural wage households. However, the difference becomes significant if we directly compare exclusively agricultural wage households and non-agricultural wage households (25.8% against 44.6%, test not shown). We also consider the dummy related to whether the household served as guarantor for others during the 12 months prior to the survey. Because we saw that there are reciprocity processes underlying the guarantor relationship, this variable is assumed to capture some of the capacity of the household to access guarantors for their own credit applications. As a group, the agricultural wage households exhibit a lower rate of being guarantors for others (24% versus 40%), which suggests that some of them are able to get guarantors without having to reciprocate through the same channel. However, the figures are very contrasted if we consider only

the exclusively agricultural wage households. For this subgroup, it seems on the contrary that being a guarantor for others is an important strategy to get a guarantor for themselves, even though it is a risky one, given that they are on average poorer and thus less in a position to bear the costs in case of repayment failure.

As a whole, the agricultural wage households do not exhibit a higher rate of informal credit uptake. For the exclusive agricultural wage households, the rate of informal credit uptake is actually lower (15%). The same patterns holds for the average informal debt amount. It might then be the case that exclusive agricultural wage households face constraints in both the formal and the informal sector. Also, most of the informal debt is coming from the households' social and family network. This result further supports the idea that non-exclusive agricultural wage households are able to rely on stronger social and family networks than the exclusive agricultural wage households.

Let us now turn to the shopkeeper. Agricultural wage households do make a higher use of this informal option (60% versus 44%), while the average amounts are similar across categories. Although average amounts are considerably lower than for the other categories of formal as well as informal loans, the rationale for reporting them separately comes from the specific purpose of this informal credit in terms of consumption smoothing and its importance in the day-to-day life of agricultural wage households, as qualitative data very clearly show.

> *During the rainy season nobody is working either in pepper or anything else [...]. Since the shopkeeper allows us to buy groceries and pay later, we get on credit what we need for our daily consumption.*

Multivariate Regression Analysis

In this section, we use regression analysis to more formally test whether agricultural wage households are less likely to be included in the formal sector, and whether, when included, they get lower loan amounts. Our variables of interest are the dummies 'non exclusive agricultural wage household' and 'exclusive agricultural wage household', keeping the 'non agricultural wage household' as the omitted category. Other explanatory variables include other sources of income, wealth variables, demographic variables, and, in some specifications, village dummies to capture local fixed effects. We treat them as control variables, although we provide some comments on the significance and sign of their coefficients, when relevant.

Our econometric analysis is not free from endogeneity issues. Reverse causality may be at play as credit access may influence activity choices. There may also be a range of omitted and/or unobserved variables that determine both the agricultural wage status and the credit profile (for example skills, credit history, risk aversion). In the absence of a proper instrument for the agricultural wage status, the econometric results have to be interpreted as partial correlations rather than as causality. However, we use the qualitative analysis to provide additional insights and we take comfort in the fact that it supports the quantitative results.

We first tested whether being an agricultural wage household had a negative effect on the probability of being a member of a formal financial institution by performing a linear probability model. The main results of the estimation are reported in Table 5, Panel A. They support the hypothesis of an exclusion effect, although only for the households relying exclusively on agricultural wage. Belonging to this category (as opposed to the reference category of households that do not engage into agricultural wage employment) reduces the probability of being a member of a formal financial institution by around 17 percentage points. While there is no effect of being engaged in independent business or non-agricultural wage employment, there is a strong and positive effect of being a farmer, a variable that is well correlated to owning land. Since land is not used as a collateral, the conventional collateral-based explanation of the land-credit nexus does not hold here. An alternative explanation is that being a farmer signals creditworthiness, given the potential of the region. Because most of the land is still accessed through inheritance, being a farmer is also likely to be correlated with stronger (or at least older) local family networks.[14] As expected, education and wealth indicators have a positive effect. Finally, we find no effect of receiving government cash transfers, and

Table 5. Access to formal financial sector and amount of formal loan

PANEL A – Dependent variable: formal sector access	(1)	(2)
Non exclusive agricultural wage	−0.061	−0.042
	(0.06)	(0.07)
Exclusive agricultural wage	−0.177**	−0.167*
	(0.08)	(0.09)
Agriculture	0.262***	0.268***
	(0.06)	(0.06)
Head education	0.157**	0.139**
	(0.06)	(0.06)
Remittances	−0.149***	−0.142**
	(0.05)	(0.06)
Government transfer	−0.048	−0.056
	(0.05)	(0.05)
House owned	0.136**	0.157**
	(0.06)	(0.06)
Boiler	0.149***	0.147***
	(0.05)	(0.05)
Financial branch in the village	0.058	
	(0.06)	
Village fixed effects	No	Yes
Constant	0.299	0.258
	(0.22)	(0.24)
R^2	0.209	0.223

PANEL B – Dependent variable: formal loan amount	(3)	(4)	(5)
Non exclusive agricultural wage	−128.233	−115.435	−166.873
	(188.82)	(188.27)	(181.22)
Exclusive agricultural wage	97.126	106.068	−72.811
	(296.41)	(300.58)	(302.60)
Guarantor for others	320.041**	328.795**	318.049**
	(141.07)	(141.11)	(139.68)
Credit with guarantor	1383.180***	1382.651***	1377.325***
	(134.95)	(135.09)	(134.10)
Mill's lambda	−586.307	−597.251	97.999
	(483.44)	(543.59)	(627.44)
chi^2	173.733	172.864	184.801
p	0.000	0.000	0.000

Notes: PANEL A: linear probability model. PANEL B: two-step Heckman procedure. Exclusion restriction: (3) boiler; (4) owned house; (5) education of head higher than complete primary school. Robust standard errors in parentheses. *, **, and *** mean that the coefficient is significantly different from 0 at the 10 per cent, 5 per cent, and 1 per cent` level, respectively. Complete variable list and regression results available in online appendix.

we find a significant and strong (around 14 percentage points) negative effect of receiving remittances. Those results are at odds with the recent endeavour by Mexican policymakers to foster financial inclusion through the public transfer and private remittances channels (Demirgüc-Kunt, López Córdova, Martinez Pería, & Woodruff, 2007; Masimo & Niño-Zarazúa, 2014). Rather, they suggest that, at least in the region under study, the formal sector is not accessed primarily for savings deposits (a result that is confirmed by qualitative evidence).

In a second stage, we modelled the amount borrowed in the formal sector, conditional upon being a member of a formal sector financial institution. Because there is non-random selection into the membership status, we performed a two-stage Heckman regression. We included the same control variables as in the previous regression, as they may impact both the probability of formal sector access and the loan amount. We also added a set of variables related to the household credit practices (whether the formal

credit was used for a productive purpose, and whether there was an uptake of informal credit), and variables related to guarantorship. The main results are reported in Table 5, Panel B.

The results show no effect of being involved in agricultural wage on the formal amount borrowed, once controlled for selection into formal sector membership. This further confirms that the exclusion processes appear to take place mainly in the previous step of becoming a member of a formal financial institution. The results also show a significant effect of the social network. There is first a direct effect: having a loan backed with a guarantor raises the formal loan amount by around US$1,380 on average. There is also a significant reciprocity effect that is not negligible in magnitude: being a guarantor for others raises the formal loan amount by around US$320. The other control variables turned out non significant.

Because we cannot rule out some endogeneity issues, we take the econometric results as suggestive rather than conclusive. In the next section, we build on qualitative analysis to examine the causality channels that induce lower formal financial inclusion, and how these exclusion processes can be mitigated, mostly via social and family networks.

VI. A Qualitative Inquiry into the Drivers of Financial Exclusion and Inclusion

The Role of Agricultural Wage Income in Shaping Financial Practices

The shaping processes can be considered either in terms of barriers or in terms of financial needs. On the one hand, because of the low, seasonal and uncertain nature of agricultural wage income flow, agricultural wage households face both quantity and risk rationing in the formal sector. Even if they do not face outright discrimination or rejection of their membership or credit applications, qualitative evidence show that they may refrain from participating in the formal sector because they know or feel that they won't meet the requirements, or because they fear they might not be able to pay back.

> *'We never tried to open an account [with a cooperative] because my sons do not work every day, it is impossible for us to deal with the burden of a loan.'*

On the other hand, the characteristics of the agricultural wage income imply that a key rationale for credit is inter-temporal consumption smoothing, for which formal credit, under its current features, is poorly suited. Conversely, specific informal credit providers, namely the shopkeeper, advances from the employer, and family loans are better tailored, because they are more flexible in terms of amount and repayment schedule, they can be renegotiated along the way, and they allow for payment in kind (See Morvant-Roux et al. (2014) for similar findings in rural Morocco). This picture of flexibility and capacity to manage repayment contrasts with the perception of stringency in case of default with the financial cooperatives, and gives the informal sector a competitive advantage.

> *'We get on credit what we need for our daily consumption, from there we adjust and in the case we have no money to pay back the shopkeeper a week later, we just give notice and he gives us the opportunity to pay later.'*

> *In the case of advances or credit from the employer, they pay with their own work, which means that they don't have to wonder how they will manage to get the cash to pay back.*

> *'I have heard that if you don't pay [the cooperative] and you are ten days late, then you have to pay more, but really more … and from there everybody is in deep trouble.'*

The Role of Family Networks and Informal Arrangements in Overcoming Barriers to Formal Financial Inclusion

Social and most of all family networks can work as gateways to formal financial inclusion in a number of ways. First, family networks often prove to be instrumental at the moment of becoming a member

of a cooperative. They provide information, give advice, and sometimes help gather the initial upfront payment required to become a member. Second, informal arrangements through family networks help to overcome the barriers related to savings and guarantor requirements in order to access a loan. As a result, participating in the formal sector becomes a family-level strategy (see also Section IV).

> *'My sister and my brother in law [who were already members] helped me to get the savings to become a member. ... They did so also in order to allow me to be a guarantor for them.'*

> *Juan chose the Caja Popular Santa María Guadalupe because he had good records from his mother, who had been a member for a long time. The account is Juan's, he has tried to open other accounts for his two sons, but has not yet been able to meet the savings requirement.*

VII. Conclusions and Policy Implications

Our study shows that agricultural workers face rationing in the formal financial sector, particularly when they exclusively rely on agricultural wage income, and particularly when it comes to joining a formal financial institution. However, it also suggests the existence of mitigating mechanisms. In particular, being able to rely on a family network provides informational and other immaterial resources that allow agricultural workers to overcome some of the barriers to formal finance, through innovative informal arrangements that inject flexibility into the formal rules and procedures. While this is not a panacea (being able to rely on such an informal network is not evenly distributed across households, and the social as well as economic costs in case of repayment default can be high), we argue that there are lessons to learn from the mechanisms underlying such informal practices. In addition, we discuss how income patterns associated with agricultural wage generate income smoothing needs that are sometimes better met by the informal rather than the formal sector, at least under their current respective characteristics.

In Mexico as in many other contexts, recent financial inclusion policies have mostly focused on the constraints of the supply side rather than on the characteristics of the demand. Our research is a contribution to a growing literature pointing out the need to better understand the demand side as well (Faz and Breloff, 2012). For example, the role of shopkeepers as key providers of credit for daily consumption needs should be better acknowledged, and their own financial needs as local financial intermediaries should be better addressed. In that perspective, formal linkages between shopkeepers and savings and credit cooperatives could be encouraged, based on the mobile banking schemes already in place in other contexts. To facilitate agricultural workers' households' access to the formal sector, scaling up the delivery of government cash transfer through formal savings deposits, and providing incentives to agricultural employers to deposit wages on formal savings accounts could be other options to explore, although a careful demand analysis for formal savings services should be conducted first.

The paper focuses on credit. We acknowledge that financial needs are wider in scope, and that credit can be an imperfect substitute for insurance, and sometimes even savings. Those issues are left for future research.

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Notes

1. Although we use the main concepts from this body of literature, we do not adopt the same approach in that we do not engage in formal modelling.
2. Recent work on secondary school enrolment in Mexico similarly shows the positive impact of extended family networks (Angelucci, De Giorgi, Rangel, & Rasul, 2010).
3. This was done both from a static (using year 2010 as the timeframe) and from a dynamic perspective (using the household lifecycle timeframe). Due to space constraints, however, the paper focuses on static, short-term analysis.
4. Land tenure for individual farmers can be either private property or *ejido*, a specific form of tenure originating in the land reform that took place during the twentieth century. The ejido tenure system underwent a major revision in 1992, making it de jure and de facto very similar to private property rights (Bouquet, 2009). A major difference is that ejido land cannot be used as a loan collateral as easily as private land. However, the local formal credit system does not rely on land collateral (see below). Thus, in this paper, we will consider landholdings irrespective of the tenure system.
5. See Vanackere (1988), Astorga Lira and Commander (1989), Barron and Rello (2000), and Carton de Grammont and Lara Flores (2010) for detailed case studies of agricultural wage labour in other regions of Mexico.
6. For supplementary material on the migrant workforce, see Rodríguez-Solís (2011).
7. Examples include moving into higher skilled jobs within the horticulture agro-business companies.
8. The non agricultural labour market does not perform much better as a financial inclusion device. Out of the 146 households involved non agricultural wage employment, 57 per cent have a formal contract and only 12 per cent have their wage deposited on a formal savings account.
9. Family members are accepted as guarantors, although in some cooperatives, spouses are not allowed anymore.
10. Emphasis added.
11. While we found no example in our own research, recent studies illustrate processes of 'dis-embeddedness', where serving as a guarantor can become a monetised service, in South Mexico (Angulo, 2014) and in North Cameroon (Ojong Diba, 2013).
12. Unlike Ayalew Ali and Deininger (2012), who use this dummy as an explanatory variable of credit access, we consider that it directly captures the first step of formal financial inclusion, and should thus be treated as an endogenous variable.
13. For formal sector members, the « quantity-rationed » dummy includes households that did not apply for a loan because they anticipated they would not comply with the requirements (as for non members), and also households whose credit application was rejected during the recall period, or for which the amount approved was less than requested.
14. Being a farmer might also entail a higher demand for productive credit, if self-financing capacity is binding. However, this is not reflected in our data on average formal debt (see below).

References

Angelucci, M., De Giorgi, G., Rangel, M. A., & Rasul, I. (2010). Family networks and school enrolment: Evidence from a randomized social experiment. *Journal of Public Economics*, *94*(3–4), 197–221. doi:10.1016/j.jpubeco.2009.12.002

Angulo, L. (2014). Microfinance and over-indebtedness: Their social costs for women. In I. Guérin, S. Morvant-Roux & M. Villareal (Eds.), *Microfinance, debt and over-indebtedness. Juggling with money* (pp. 232–252). London: Routledge.

Astorga Lira, E., & Commander, S. (1989). Agricultural commercialisation and the growth of a migrant labour market in Mexico. *International Labour Review*, *128*, 769–790.

Ayalew Ali, D., & Deininger, K. (2012). *Causes and implications of credit rationing in rural Ethiopia: the importance of spatial variation*. (Policy Research Working Paper No 6096). Washington DC: The World Bank.

Bardhan, P. K. (1980). Interlocking factor markets and agrarian development: A review of issues. *Oxford Economic Papers*, *32*(1), 82–98.

Bardhan, P. K. (1989). *The economic theory of agrarian institutions*. Oxford: Clarendon Press.

Barron, M. A., & Rello, F. (2000). The impact of the tomato agroindustry on the rural poor in Mexico. *Agricultural Economics*, *23*(3), 289–297. doi:10.1111/j.1574-0862.2000.tb00280.x

Binswanger, H., & Rosenzweig, M. (1986). Behavioural and material determinants of production relations in agriculture. *Journal of Development Studies*, *22*(*3*), 503–539. doi:10.1080/00220388608421994

Boucher, S., Carter, M. R., & Guirkinger, C. (2008). Risk rationing and wealth effects in credit markets: Theory and implications for agricultural development. *American Journal of Agricultural Economics*, *90*(2), 409–423. doi:10.1111/j.1467-8276.2007.01116.x

Boucher, S., & Guirkinger, C. (2007). Risk, wealth, and sectoral choice in rural credit markets. *American Journal of Agricultural Economics*, *89*(4), 991–1004. doi:10.1111/j.1467-8276.2007.01009.x

Boucher, S., Guirkinger, C., & Trivelli, C. (2009). Direct elicitation of credit constraints: Conceptual and practical issues with an application to peruvian agriculture. *Economic Development & Cultural Change*, *57*(4), 609–640. doi:10.1086/598763

Bouquet, E. (2009). State-led land reform and local institutional change: Land titles, land markets and tenure security in Mexican communities. *World Development*, *37*(8), 1390–1399. doi:10.1016/j.worlddev.2008.08.015

Braverman, A., & Guasch, J. L. (1986). Rural credit markets and institutions in developing countries: Lessons for policy analysis from practice and modern theory. *World Development*, *14*(10–11), 1253–1267. doi:10.1016/0305-750X(86)90104-X

Carton de Grammont, H., & Lara Flores, S. (2010). Productive restructuring and "standardization" in Mexican horticulture: Consequences for labour. *Journal of Agrarian Change*, *10*(2), 228–250. doi:10.1111/j.1471-0366.2009.00246.x

Collins, D., Morduch, J., Rutherford, S., & Ruthven, O. (2009). *Portfolios of the poor. How the world's poor live on $2 a day*. Princeton, NJ: Princeton University Press.

Cox, D., & Fafchamps, M. (2007). Extended family and kinship networks: Economic insights and evolutionary directions. In P. Schultz & J. Strauss (Eds.), *Handbook of development economics* (Volume 4, p. 3711–3784). Amsterdam: Elsevier. doi:10.1016/S1573-4471(07)04058-2

Datta, S. K., Nugent, J. B., Tishler, A., & Wang, J. -L. (1988). Seasonality, differential access and interlinking of labour and credit. *The Journal of Development Studies*, *24*(3), 379–393. doi:10.1080/00220388808422075

De Janvry, A., Fafchamps, M., & Sadoulet, E. (1991). Peasant household behaviour with missing markets: Some paradoxes explained. *The Economic Journal*, *101*(409), 1400–1417. doi:10.2307/2234892

De Janvry, A., Sadoulet, E., & Wilcox, L. (1989). Rural labour in Latin America. *International Labour Review*, *128*(6), 701–730.

Demirgüc-Kunt, A., Beck, T., & Honohan, P. (2008). *Finance for all? Policies and pitfalls in expanding access*. Washington, DC: The World Bank.

Demirgüc-Kunt, A., López Córdova, E., Martinez Pería, M. S., & Woodruff, C. (2007). *Remittances and banking services: Evidence from Mexico*. Washington, DC: The World Bank.

Eswaran, M., & Kotwal, A. (1985). A theory of contractual structure in agriculture. *American Economic Review*, *75*(3), 352–367.

Eswaran, M., & Kotwal, A. (1986). Access to capital and agrarian production organisation. *The Economic Journal*, *96*(382), 482–498. doi:10.2307/2233128

Fafchamps, M. (1999). Risk sharing and quasi-credit. *The Journal of International Trade & Economic Development*, *8*(3), 257–278. doi:10.1080/09638199900000016

Fafchamps, M. (2006). Development and social capital. *Journal of Development Studies*, *42*(7), 1180–1198. doi:10.1080/00220380600884126

FAO (2012). *Decent rural employment for food security: A case for action*. Rome: Gender, Equity and Rural Employment Division. FAO.

Faz, X., & Breloff, P. (2012). *A structured approach to understanding the financial needs of the poor in Mexico*. Washington, DC: CGAP.

Gindling, T. H., & Newhouse, D. (2014). Self-employment in the developing world. *World Development*, *56*(April), 313–331. doi:10.1016/j.worlddev.2013.03.003

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, *91*(3), 481–510. doi:10.1086/228311

Guérin, I., D'Espallier, B., & Venkatasubramanian, G. (2013). Debt in rural South India: Fragmentation, social regulation and discrimination. *The Journal of Development Studies*, *49*(9), 1155–1171. doi:10.1080/00220388.2012.720365

Guérin, I., Morvant-Roux, S., & Servet, J. -M. (2011). Understanding the diversity and complexity of demand for microfinance services: Lessons from informal finance. In B. Armendariz & M. Labie (Eds.), *Handbook of microfinance* (pp. 101–123). Washington, DC: World Scientific Publishing.

Guérin, I., Roesch, M., Venkatasubramanian, G., & D'Espallier, B. (2012). Credit from whom and for what? The diversity of borrowing sources and uses in rural Southern India. *Journal of International Development*, *24*, S122–S137. doi:10.1002/jid.1785

Guirkinger, C. (2008). Understanding the coexistence of formal and informal credit markets in Piura, Peru. *World Development*, *36*(8), 1436–1452. doi:10.1016/j.worlddev.2007.07.002

Johnson, S. (2005). Fragmentation and embeddedness: An alternative approach to the analysis of rural financial markets. *Oxford Development Studies*, *33*(3–4), 357–375. doi:10.1080/13600810500199152

Johnson, S., & Nino-Zarazua, M. (2011). Financial access and exclusion in Kenya and Uganda. *Journal of Development Studies*, *47*(3), 475–496. doi:10.1080/00220388.2010.492857

Kanbur, R., & Shaffer, P. (2007). Epistemology, normative theory and poverty analysis: Implications for Q-squared in practice. *World Development*, *35*(2), 183–196. doi:10.1016/j.worlddev.2005.10.016

Karlan, D. S. (2007). Social connections and group banking. *The Economic Journal*, *117*(517), F52–F84. doi:10.1111/j.1468-0297.2007.02015.x

Kochar, A. (1997). An empirical investigation of rationing constraints in rural credit markets in India. *Journal of Development Economics*, *53*(2), 339–371. doi:10.1016/S0304-3878(97)00020-5

Lipton, M. (1992). Economics and anthropology: Grounding models in relationships. *World Development*, *20*(10), 1541–1546. doi:10.1016/0305-750X(92)90073-5

Masimo, S., & Niño-Zarazúa, M. (2014). *Social service delivery and access to financial innovation. The impact of Oportunidades' electronic payment system in Mexico*. (Working paper 2014/34). Helsinki: UNU-Wider.

Morvant-Roux, S., Guérin, I., Roesch, M., & Moisseron, J. -Y. (2014). Adding value to randomization with qualitative analysis: The case of microcredit in rural morocco. *World Development*, *56*(April), 302–312. doi:10.1016/j.worlddev.2013.03.002

Ojong Diba, N. (2013). *Microfinance, informal financial mechanisms and low-income populations*. Geneva: The Graduate Institute of International and Development Studies.

Rodríguez-Solís, G. (2011). Diversidad de arreglos y contratos de jornaleros agrícolas en Autlán, Jalisco. In *8o Congreso de la Asociación Mexicana de Estudios Rurales*. Puebla, Mexico.

Shoji, M., Aoyagi, K., Kasahara, R., Sawada, Y., & Ueyama, M. (2012). Social capital formation and credit access: Evidence from Sri Lanka. *World Development*, *40*(12), 2522–2536. doi:10.1016/j.worlddev.2012.08.003

Stiglitz, J. E., & Weiss, A. (1981). Credit Rationing in Markets with Imperfect Information. *The American Economic Review*, *71*(3), 393–410. doi:10.2307/1802787

The World Bank. (2007). *World Development Report 2008. Agriculture for development*. Washington, DC: The World Bank.

Vanackere, M. (1988). Conditions of agricultural day-labourers in Mexico. *International Labour Review*, *127*(1), 91–110.

Zeller, M. (1994). Determinants of credit rationing: A study of informal lenders and formal credit groups in Madagascar. *World Development*, *22*(12), 1895–1907. doi:10.1016/0305-750X(94)90181-3

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